REMARKS

Claims 1-38 are pending in this application. Claims 12, 13, 21, 24, 27, and 29-35 have been subjected to a restriction requirement and have been withdrawn from consideration. Claims 1-11, 16-20, 22, 23, 25, and 36-38 have been rejected and claims 14, 15, 26, and 28 have been allowed.

Restriction Requirement

Applicant acknowledges the finality of the restriction requirement and the election of species requirement.

Rejection Over Ohnaka et al.

The Office has rejected claims 1-11, 16-20, 22-23, 25, and 36-38 under 35 U.S.C. § 102 (b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Ohnaka et al. (U.S. Patent No. 5,194,333) for the reasons listed on pages 3-5 of the Office Action. Applicant respectfully traverses this rejection.

The rejected claims all contain the limitation that the coating (or organosilane or polycarbosilane in the coating) is bonded to the metal oxide (or silica) substrate through at least three attachment points. As explained in the specification in pages 9-11, the invention improved over the conventional bidentate silanes by using polydentate silanes. Bidentate silanes are bound to the silica surface through two siloxane groups extending from the silicon-carbon backbone of the silane. *See* U.S. Patent Nos. 5,869,724 and 5,948,531; *see also* Exhibit A, LCGC Volume 19, Number 2, p. 128 (February 2001). Thus, the resulting silica has the benefit of two attachment points on the silica surface via siloxane groups.

The present claims, however, require three attachments points via a siloxane group. One way of obtaining three such attachment points is by using polydentate silanes, such as those discussed in the specification and represented by formula I on page 11 of the present specification. Like bidentate silanes, each attachment point to the silica surface is by way of a siloxane group. Unlike bidentate silanes, however, polydentate silanes contain three such attachment groups instead of two.

The Office, however, has not substantiated that Ohnaka et al. teaches or suggests a coating (or organosilane or polycarbosilane in the coating) that is bonded to the metal oxide (or silica) substrate through at least three attachment points. The Office merely alleges that such a feature would have been inherent based on the disclosure of Example 1. A closer examination of Ohnaka et al. establishes the fallacy of the Office's allegation.

Ohnaka et al. describe that that their silica packing material is coated with repeating units of the polycarbosilanes of the formula (I). These polycarbosilanes are obtained by heating a linear polysilane of the formulae (II) or (III), causing rearrangement of the polysilane structure. *See columns 2-3.* During this conversion process,

> it is possible to prevent detachment of the polycarbosilane by preliminarily introducing various functional groups to the silica gel surface to reinforce the bond between the polycarbosilane and the silica gel carrier.

See column 4, lines 40-45. Thus, as shown in the chemical reaction in column 4 of Ohnaka et al., the silica surface is pre-coated with functional groups (alkyl groups) before coating with the polysilane. Thus, as shown in this chemical reaction, the alkyl group serves as the link between the silica gel surface and the polycarbosilane.

Ohnaka et al. importantly notes that the polycarbosilane "contains no siloxane bond" in its molecule. *See column 3, lines 33-34.* Thus, it is excellent in the desired acid resistance and alkali resistance that Ohnaka et al. discusss in column 1. *See column 3, lines 34-35.*

In light of this disclosure, the Office has not shown that it is "inherent" that the polycarbosilanes described in Example 1 are bonded to the silica gel surface. Rather, as illustrated by the chemical reaction in column 4, every polycarbosilane is bonded to an alkyl functional group. Without the presence of such alkyl groups, the polycarbosilanes would become detached from the silica gel.

Further, the Office has not substantiated that Ohnaka et al. teach or suggest three such attachment points by siloxane groups. Ohnaka et al. expressly discloses that the polycarbosilane contains no siloxane groups. Thus, there can be no bonding through three attachment points via siloxane groups.

Further, the Office has pointed to no disclosure that would suggest modifying Ohnaka et al. to suggest such a bonding or such attachment points. Thus, the Office has not substantiated that Ohnaka et al. anticipate or make obvious the rejected claims. Accordingly, Applicant respectfully requests withdrawal of this ground of rejection.

<u>Allowable Subject Matter</u>

Applicant appreciates the acknowledgement that claims 14, 15, 26, and 28 are allowed.

CONCLUSION

For the above reasons, as well as those of record, Applicant respectfully requests the Office to withdraw the pending grounds of rejection and allow the pending claims.

If there is any fee due in connection with the filing of this Request, including a fee for any extension of time not accounted for above, please charge the fee to our Deposit Account No. 50-0843.

Respectfully Submitted,

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Date: March 16, 2004

CUSTOMER NUMBER

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PATENT TRADEMARK OFFICE

of band broadening is bandwidth (t_w) or, more correctly, the number of theoretical plates (N) in the column. Sometimes called band dispersion or band spreading. See Figure 2.

Bandwidth (t_w): The width of the chromatographic band during elution from the column. It usually is measured at the baseline by drawing tangents to the inflection points on the sides of the Gaussian curve that represents the peak. Small bandwidths usually represent efficient separations; also called peak width. See Figure 2.

Bar: A unit of pressure measurement in HPLC equal to 1 atm, ~15 lb/in.^{2}, or 0.1 MPa.

BET method: Developed by Bruner, Emmett, and Teller (BET), a method for measuring surface area that uses nitrogen adsorption–condensation in pores at liquid nitrogen temperature. Pore volume and pore size distribution also can be obtained from BET method calculations.

Bidentate silane: A specific type of bonded phase in which a short hydrocarbon bridge connects two silicon atoms in a silane that is bound to the surface through two siloxane groups.

Binary mobile phase: Mobile phase comprising two solvents or buffers.

Biocompatible: A term to indicate that the column or instrument component will not irreversibly or strongly adsorb or deactivate biomolecules such as proteins. Frequently means metal-free or ceramic surfaces and components.

Bonded-phase chromatography: The most popular mode in LC in which a phase chemically bonded to a support is used for separation. The most popular support for bonded-phase chromatography is microparticulate silica gel, and the most popular type of bonded phase is organosilane such as octadecyl for reversed-phase chromatography. Approximately 70% of all HPLC applications are performed using chemically bonded phases.

Bonded-phase concentration: See ***coverage.***

Boxcar chromatography: See ***column switching.***

Breakthrough volume: The volume at which a particular solute pumped continuously through a column will begin to be eluted. It is related to the column volume and the retention factor of the solute. It is useful to determine the total sample capacity of the column for a particular solute.

Buffer: A solution that maintains constant pH by resisting changes in pH from dilution or addition of small amounts of acids and bases.

Buffer capacity: A quantitative measure of the potential of a buffer solution (defined as the number of equivalents of strong acid or base to cause a one pH unit change in 1 L of a buffer solution) or simply the ability of a buffer to withstand injections of a buffered sample solution without changing mobile-phase pH; capacity determined by pH, buffer pK_a, and buffer concentration.

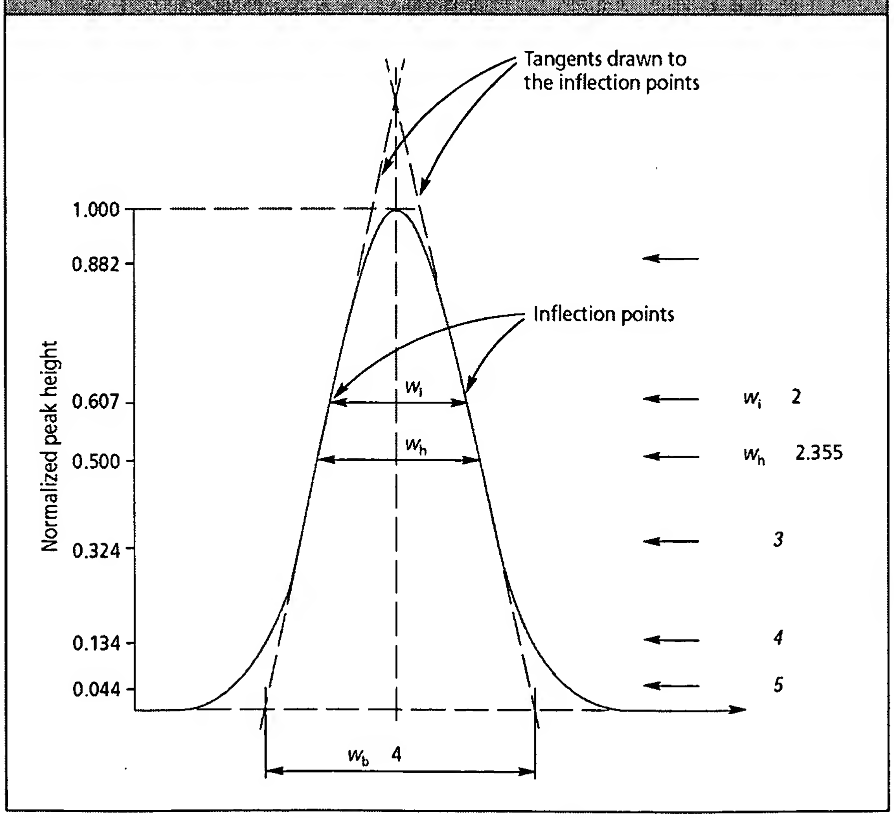

Figure 2: Widths of a Gaussian peak at various heights as a function of the standard deviation (σ) of the peak. (Modified with permission from reference 2.)

C

C term: The interphase mass transfer term of the van Deemter equation. See also ***mass transfer*** and ***van Deemter equation.***

C8: See ***octylsilane.***

C18: See ***octadecylsilane.***

C_4, C_8, C_{18}, etc.: Refer to the alkyl-chain length of a reversed bonded phase.

C_S: See ***Langmuir isotherm.***

Capacity: See ***sample capacity.***

Capacity factor (k'): Old term for a chromatographic parameter that measures the degree of retention. Now defined as the ***retention factor*** (k) by the International Union of Pure and Applied Chemistry (IUPAC). See also ***retention factor*** for method of calculation.

Capillary column: Refers to columns with inner diameters less than 0.5 mm.

Capillary electrochromatography (CEC): A hybrid technique in which capillary columns are packed with chromatographic sorbents and electroosmotic flow rather than pressure moves mobile phase through the column; technique has the surface-mediated selectivity potential of HPLC and the high efficiency of capillary electrophoresis (CE).

Capillary gel electrophoresis (CGE): A technique in which a capillary is filled with, or the walls coated or covalently bonded with, cross-linked polyacrylamide to simulate slab gel electrophoresis; this polymer network uses a sieving mechanism; used for protein, carbohydrate, and DNA separations such as fingerprinting and sequencing.

Capillary isoelectric focusing : Separation is based on isoelectric points of proteins; the capillary is filled with solution; the sample is introduced into the capillary in the presence of ampholytes; under the application of an electric field, the protein migrates until it reaches a pH at which it is neutralized and maintains that position in the capillary.

Capillary LC: Generally refers to HPLC performed in a fused-silica or other type of